

# BALL VALVE WITH BUTT-WELD ENDS

KM 9103.X-HT

DN 25 PN 40

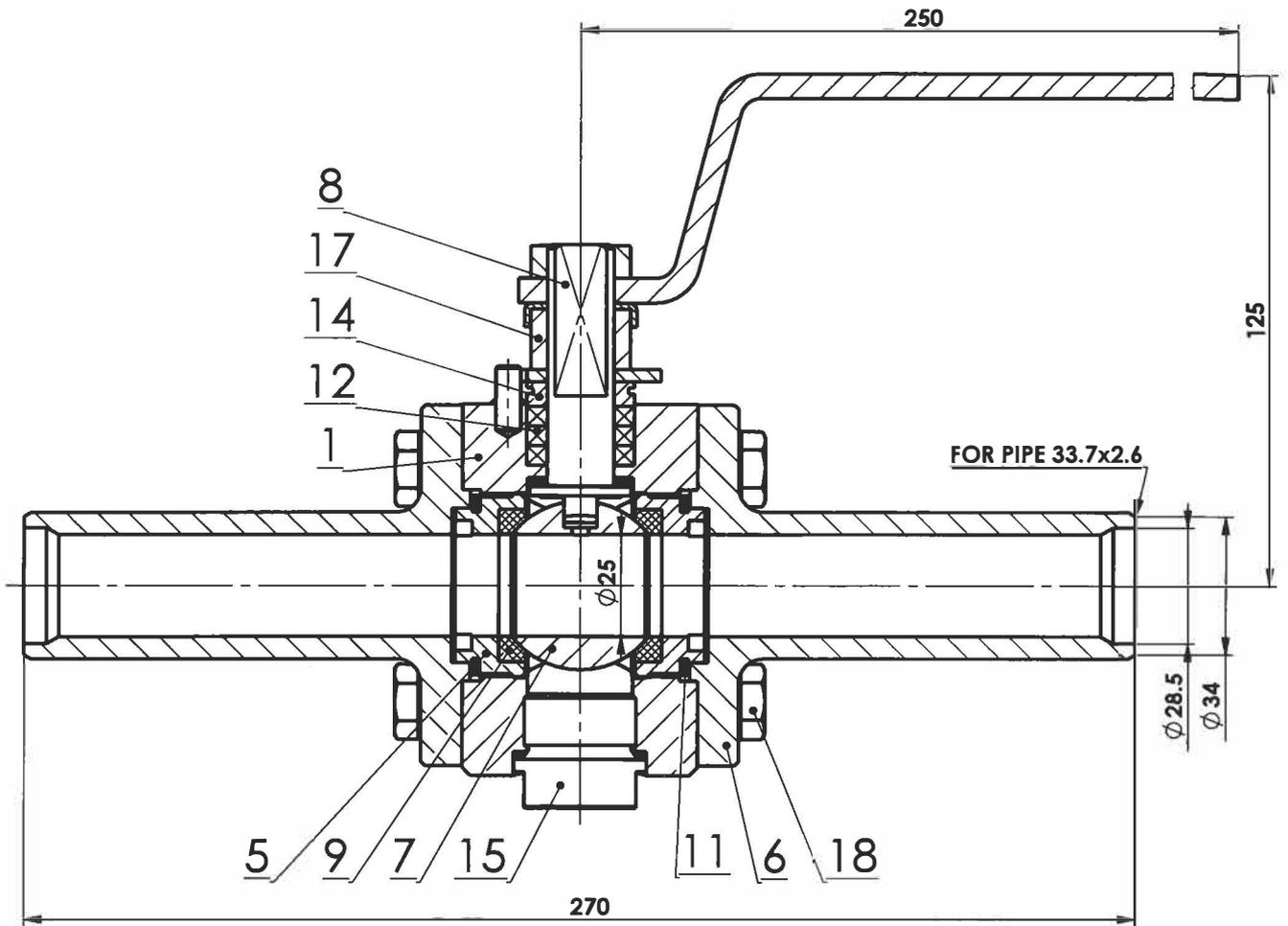


TABLE OF MATERIALS

Type KM 9103.X-HT		X=8
No.	Part	Standard, material
1	Body	1.5415 (16Mo3)
5	Seat body	
6	Socket	
7	Ball	1.4923
8	Stem	1.4923
9	Seat	Carbon+Sb
11	Sealing	Graphite
12	Packing	Graphite
14	Gland cover	CSN 17 027
15	Plug	1.5415 (16Mo3)
17	Nut	A194 Gr. 2H
18	Bolt	A193 B7

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# **INSTALLATION AND OPERATING INSTRUCTIONS**

## **BALL VALVES KM 91**

## **THREE-WAY BALL VALVES KM 93**

## **FOUR-WAY BALL VALVES KM 94**



**Contents:**

- 1. Technical description ..... 3
- 2. Application ..... 4
  - 2.1. General application ..... 4
  - 2.2. Ball valves intended for use in potentially explosive atmospheres ..... 5
    - 2.2.1. Terminology..... 5
    - 2.2.2. Principles of use of ball valves in potentially explosive atmospheres ..... 6
- 3. Surface protection..... 9
- 4. Marking ..... 10
- 5. Packaging and transportation ..... 10
- 6. Storage.....11
- 7. Installation.....11
  - 7.1. Preparation for installation .....11
  - 7.2. Installation .....11
- 8. Commissioning ..... 12
- 9. Operation and maintenance ..... 12
  - 9.1. Operation during service ..... 12
  - 9.2. Maintenance..... 12
- 10. Repairs..... 13
- 11. Testing..... 13
- 12. Spare parts and servicing ..... 13
- 13. Special provisions ..... 14
- 14. Guarantee and final provisions ..... 14
- 15. Disposal of the product ..... 15
- 16. Attachments ..... 15



## 1. Technical description

The production range of ball valves is described in the catalogue sheets of the Manufacturer. The ball valves are designed and manufactured in accordance with standards EN 1983, EN ISO 17292, ČSN 13 3060, DIN 3357, BS 5351, API 608, API 6D (EN 13942) or as required by the Customer.

Individual parts of ball valves are made of rolled or forged steel grades (except for sealing components, bearings, etc.). The material composition of ball valves depends on service conditions (fluid, chemical composition of the fluid, fluid concentration, fluid temperature, ambient temperature, fluid pressure, etc.). List of materials for bodies and bonnets (shells) of ball valves is approved by notified body which is authorised for certification of pressure equipment.

Pressure-temperature ratings of most used materials are shown on manufacturer's internet webpage 'www.kearm.cz' under 'certificates and documents - Ball valves KM - General information'. Detailed information is available upon request.

The main parts of every ball valve are body, bonnet, bolting components or sockets, stem, ball, seats and sealing components. If the seats are metal or Sb-filled carbon seats, the ball is lapped together with the seats. The variety of designs is based on the way the ball valves are used and on design specifications. Individual designs of ball valves are specified in detail in the company's datasheets located on manufacturer's internet webpage.

Dimensions of connecting flanges meet the requirements of EN 1092-1, EN 1795-1 or ANSI B 16.5, or the requirements specified by the Customer.

Dimensions of welding ends meet the requirements of EN 12627, EN ISO 17292 or ANSI B 16.25, or the requirements specified by the Customer.

The form of threaded ends corresponds to types Rc and Rp according to ISO 7-1 or type G according to ISO 228-1 or according to ASME B1.20-1,3 or BS 21, or as specified by the Customer. Union ends have metric connecting threads with fine pitch according to ČSN ISO 724 or straight pipe thread according to EN ISO 228-1. Threads and dimension of pipe unions meet the requirements of EN ISO 8434-1.

Face-to-face and end-to-end dimensions of ball valves meet the requirements of EN 558, EN 12982, or ANSI B 16.10, or the requirements specified by the Customer. Wafer-type ball valves have their face-to-face dimensions not standardized; therefore those dimensions are determined by the Manufacturer.

The dimensions of the ball valve bores meet the requirements of specified design standards EN 1983, EN ISO 17292, DIN 3357, API 608, BS 5351, or API 6D (EN 13942). **Based on the flow rate**, the Customer has to specify whether a ball valve with standard, full or reduced bore is demanded.

***Based on the way of ball sealing, the following ball valve designs are produced:***

- 1) thermoplastic – metal (seat made of thermoplastics – metal ball)
- 2) carbon – metal (carbon seat filled with antimony (Sb))
- 3) metal – metal (metal seat – metal ball)

***Based on the way of stem sealing, the following ball valve designs are produced:***

- 1) sealing by means of O-rings
- 2) packing made of graphite (graphite cord, expanded graphite)
- 3) special packing (for instance, for low emission service, cryogenic applications, etc.)

The way the seats, stem, bonnets, sockets and joints are sealed depends on the fluid, its corrosivity, service temperature and pressure, and required emissions.

Ball valves manufactured in accordance with standards API 608, API 6D and BS 5351 are designed to be resistant to formation of electrostatic discharges (anti-static) and to be fire resistant (fire-safe). Ball

valves according to standard EN 1983 are manufactured in anti-static design as a standard, but in fire-safe design are manufactured only on request of the Customer. The ball valves in fire-safe design are certified according to standard EN ISO 10497 or API 607 and in design for use in potentially explosive atmospheres are certified according to standard EN 13463-1.

Ball valves intended for transport of oxygen are manufactured and packed in special regime and are certified by Engineering Test Institute (SZU), Brno.

Ball valves can be modified to comply with requirements of applicability in sulphurous environments (NACE MR 0175 or EN ISO 15156).

The ball valves are operated by means of a lever, by turning through an angle of 90°. End positions are limited by stoppers. In open position, the directly flow ball valve lever is parallel to the piping axis. The position of ball of three-way and four-way ball valves is determined with position indicating device and the form of flow ball is stamped on the end face of the stem. Other operating devices are hand wheel with gearbox, electric actuator or pneumatic actuator. In this case the ball valves do not have their positions limited by stoppers, and the end position must be set on the gearbox or actuator. Dimensions of connecting flanges for installation of actuators meet the requirements of ISO 5211. The actuator size depends on the maximum service pressure drop through the ball.

If required by service conditions, the ball valves may be equipped with a heating jacket or an extension piece with extended packing, as required by the Customer.

## 2. Application

### 2.1. General application

The ball valves are isolating bidirectional valves designed to be used to open or close the service fluid flow fully. **They can not be operated in half-open positions of ball and used for regulation of fluid flow - in such case the manufacturer does not guarantee tightness of the valve obturator.** They can be installed into the piping in any arbitrary position but if equipped with an actuator or a hand wheel and gearbox, the technical requirements as to the installation position of the gearbox or actuator shall be met.

The ball valves are approved in accordance with the Decree of the Government No. 219/2016 Coll., and in accordance with the Directive 2014/68/EU of the European Parliament and of the Council, as pressure equipment within the meaning of piping and pressure equipment for the use of fluids in group 1 (hazardous fluids under a special legal regulation - Regulation of the European Parliament and of the Council No 1272/2008) and in group 2 (other fluids not listed in group 1).

The ball valves are intended to be used in industrial applications – water supply systems, conventional power engineering, petrochemical industry, chemical industry and gas industry. The resistance of the valve to the service fluid and its temperature is limited by the chemical composition of materials of the valve. Therefore it is recommended to consult the suitability for the fluid with the Manufacturer.

For liquid media with water content, the operator must ensure that the media does not freeze in the valve. If such a freezing occurs the valve must be put out of service. If during operation a solidification of media without water content happens (i.e. phase transition due to temperature decrease), the valve must not be controlled with the control stem until the media after temperature rise melts completely.

The service fluid in ball valves with seat sealing “thermoplastics - metal” and “carbon - metal” shall not contain hard and abrasive particles as this could damage the sealing surfaces and bring about heavier untightness. The same applies to impurities in the piping system during installations, repairs or replacements. These ball valves are susceptible to the content of mechanical impurities in the fluid, therefore it is necessary to consult every such case with the Manufacturer in advance and have it approved.



manufacturer of industrial valves

Ball valves with “metal - metal” sealing system are intended for fluids which may contain hard mechanical impurities. The maximum allowable size of these particles is 5 mm in case of floating seats with coil springs, maximum 0.5 mm in case of seats with disc springs, and in case of other seats maximum 0.1 mm.

For distribution of compressed air in mines, quarries, etc., ball valves with seat sealing “thermoplastics - metal” sealing are used, and because the impurities in the fluid affect the obturator tightness and increase the operating torque gradually, the maximum allowable size of mechanical impurities is 30 µm and the maximum allowable content of impurities in the transported air is 20 g·m<sup>-3</sup>.

## 2.2. Ball valves intended for use in potentially explosive atmospheres

### 2.2.1. Terminology

The ball valves intended for use in potentially explosive atmospheres comply with the design requirements of Government Regulation No. 23/2003 Coll. and the European Directive 94/9/EC (ATEX), Technical regulation of the Eurasian Custom Union TP TC 012/2011, and comply with standard ČSN EN 13463-1.

The ball valves are categorized into groups according to explosive atmosphere in which they are intended for use. There are two groups defined:

- Ball valves belonging to the **equipment group I** are intended for use in underground parts of mines, and in those parts of surface installations of such mines, liable to be endangered by firedamp and/or combustible dust. This equipment group is split into category M1 and category M2 based on required safety level. Marking of the equipment group and category is stamped on the label of ball valve.

**Table A – Relation between categories and dangerous atmospheric conditions**

Category		Designed for atmospheric conditions	Also applicable for atmospheric conditions
M1	Firedamp or combustible dust	Dangerous atmospheric conditions 1 (explosive atmosphere)	Dangerous atmospheric conditions 2 (potentially explosive atmosphere)
M2	Firedamp or combustible dust	Dangerous atmospheric conditions 2 (potentially explosive atmosphere)	-

- Ball valves belonging to the **equipment group II** are intended for use in other places liable to be endangered by explosive atmospheres. This equipment group is split into subgroups of IIA, IIB, and IIC. Unless there is a subgroup stamped on the label of the ball valve but the main group II only, the ball valve can be used for atmosphere of all three subgroups.

**Table B – Relation between subgroups for equipment group II**

Subgroup of explosive atmosphere	Equipment with stamped subgroup, which can be used in this atmosphere
IIA	IIA, IIB, IIC
IIB	IIB, IIC
IIC	IIC

Equipment group II is split into category 1, 2 and 3 based on required safety level. Letters “G” or “D” are assigned to marking of the safety category of equipment.

- Letter “G” – indicates explosive atmosphere consisting of gases, vapours or mists or their mixture with air
- Letter “D” – indicates explosive atmosphere consisting of a mixture of combustible dust and air.

These data are also stamped on the identification plate of the ball valve.

The grade of danger the existence of an explosive atmosphere is classified by into "zones". For gases and vapours are defined as Zone 0, 1 and 2. For dusts are defined as Zone 20, 21 and 22.

The following table applies for use of ball valves classified in equipment group II in these zones:

**Table C – Use of equipment group II in different zones**

Zone	Applicable safety category of equipment	Type of explosive atmosphere
0	1G	mixture of gas / air or mixture of vapour / air or mixture of mist / air
1	1G or 2G	mixture of gas / air or mixture of vapour / air or mixture of mist / air
2	1G, 2G or 3G	mixture of gas / air or mixture of vapour / air or mixture of mist / air
20	1D	mixture of dust / air
21	1D or 2D	mixture of dust / air
22	1D, 2D or 3D	mixture of dust / air

- The manufacturer marks the ambient temperature in service on an identification plate with symbol “TX”, because the maximum surface temperature of ball valves does not depend on the valves themselves but mostly on the service conditions and ball valves are small equipment. This is valid for ball valves categorized under equipment group II.
- Example of marking on identification plate of ball valve:  
Equipment group I: I M2  
Equipment group II: II 1GD IIC TX
- Detailed terminology of explosive atmosphere is specified in standards EN 13237, EN 13463-1, EN 1127-1 and EN 1127-2+A1.

The measures in the design, operation and maintenance activities are based on the ignition hazard assessment in accordance with EN 13463-1, that those valves meet the requirements for equipment group I, category M1 and M2; equipment group II, category 1, 2 and 3 (Zone 0, 1 and 2), the letter G and equipment group II, category 1, 2 and 3 (Zone 20, 21 and 22), the letter D.

Detailed assign to particular range of ball valves is specified in relevant certificates.

### 2.2.2. Principles of use of ball valves in potentially explosive atmospheres

General principles of use of ball valves are set out in Chapter 2.1.

Additional conditions for the use of ball valves in potentially explosive environments are based on the ignition hazard assessment in accordance with EN 13463-1, which is stored by a certification body and the manufacturer.

Operation of ball valves in explosive atmospheres must respect the principles set out in the standards ČSN EN 13463-1, ČSN EN 1127-1, 2 and in Chapter 2 of Installation and operating instructions.

**Table D – Principles of use of ball valves as equipment of groups I and II**

<b>Potential ignition sources</b>	<b>Protective measures to eliminate the occurrence of effective sources</b>
Hot surfaces	User is obliged, based on the manufacturer's information of thermal use of the ball valve and the relevant standards (EN 1127-2+A1 or EN 13643-1), set a maximum temperature of the surface of the valve of particular equipment group and its safety category and ensure necessary safety precautions when operating this valve.
Mechanically generated sparks, overheating due to friction	Ensure that the closing or opening speed is <b>less than 1 m/s</b> in order to avoid overheating due to friction in the area of "ball-seat", "stem-axial bearing" and "stem-packing".
Sparks generated mechanically due to careless handling of steel hand tools	<p>Maintenance of valves belonging to equipment group I:</p> <ul style="list-style-type: none"> <li>- atmospheric conditions 1 (explosive atmosphere) <ul style="list-style-type: none"> <li>– steel hand tools are forbidden</li> </ul> </li> <li>- atmospheric conditions 2 (potentially explosive atmosphere) <ul style="list-style-type: none"> <li>– steel hand tools are allowed</li> </ul> </li> </ul> <p>Maintenance of valves belonging to equipment group II:</p> <ul style="list-style-type: none"> <li>- zone 0 and 20 – steel hand tools are forbidden</li> <li>- zone 21 and 22 – steel hand tools are allowed</li> </ul>
Sparks generated mechanically due to impact of steel object into outer surface of ball valve	<p>Mass content of the paint of valves must not reach 25% aluminium content.</p> <p>Identification plate on the valve must be manufactured from austenitic stainless steel.</p>
Tools generating clumps of sparks (grinding, cutting)	<p>Maintenance of valves belonging to equipment group I:</p> <ul style="list-style-type: none"> <li>- atmospheric conditions 1 (explosive atmosphere) <ul style="list-style-type: none"> <li>– tools are forbidden</li> </ul> </li> <li>- atmospheric conditions 2 (potentially explosive atmosphere) <ul style="list-style-type: none"> <li>– tools are allowed only assuming that there is not explosive atmosphere in the workplace and settled dust was removed from the workplace or the workplace was moisturized so that no dust can be churned into the air and any process of smoldering can not arise.</li> </ul> </li> </ul> <p>Maintenance of valves belonging to equipment group II:</p> <ul style="list-style-type: none"> <li>- zone 0 and 20 – tools are forbidden</li> <li>- zone 21 and 22 – tools are allowed only assuming that the workplace is shielded from other space of zones 21 and 22 and settled dust was removed from the workplace or the workplace was moisturized so that no dust can be churned into the air and any process of smoldering can not arise.</li> </ul>
Charging of layers of paint on the surface of the valve by static electricity - risk of electrostatic discharge	<p>For ball valves belonging to subgroups IIA and IIB shall apply:</p> <p>Film thickness must not exceed 2 mm.</p> <p>Breakdown voltage of layer (paint) must be less than 4 kV (protection against creepage discharge from surface layer of paint).</p>
Charging of layers of paint on the surface of the valve by static electricity - risk of electrostatic discharge	<p>For ball valves belonging to subgroup IIC shall apply:</p> <p>Film thickness must not exceed 0.2 mm.</p> <p>Breakdown voltage of layer (paint) must be less than 4 kV (protection against creepage discharge from surface layer of paint).</p>

<b>Potential ignition sources</b>	<b>Protective measures to eliminate the occurrence of effective sources</b>
Stray electric currents	Ball valve built in the piping system must be conductively connected to protection system using a conductor with corresponding transmission capacity, or must be connected to earth.
Lightning strike	User is fully responsible for protection of ball valves by using suitable measures according to corresponding standards EN 1127-2+A1 or EN 1127-1.
Ultrasonic waves	Ball valves belonging to equipment groups I and II: It is allowed to use ultrasonic equipment using waves with a frequency up to 10 MHz, while the intensity of generated acoustic field shall not exceed 1 mW/mm <sup>2</sup> .
Electromagnetic waves from 3x10 <sup>11</sup> Hz to 3x10 <sup>15</sup> Hz	Valves belonging to equipment group I and II - all categories: - equipment that could cause ignition by resonance absorption is not allowed. For valves belonging to equipment group I, category M2, and equipment group II, category 3, the use of equipment generating radiation shall be allowed only when: - the energy of radiated impulses or the energy of continuous radiation are limited to such a low value that eliminates the ignition of an explosive atmosphere, or - the radiation is safely enclosed for any leakage of radiation, which could cause ignition of an explosive atmosphere when escaping from an enclosed zone into the potentially explosive zone, and it can not happen that on the outside of the device may arise hot surfaces capable of ignition of an explosive atmospheres and the explosive atmosphere can not penetrate into the enclosed zone or during explosion inside the enclosed zone it can not be transmitted to the potentially explosive zone. User is fully responsible for ensuring compliance with these provisions.
Radio (RF) electromagnetic waves from 10 <sup>4</sup> Hz to 3x10 <sup>12</sup> Hz	Valves belonging to equipment group I and II - all categories: A safe distance must be kept in all directions between the nearest parts where the radiation is generated, and the receiving antenna in the potentially explosive environment. User is fully responsible for ensuring compliance with these provisions.
Ionizing radiation	Valves belonging to equipment group I and II: Radiation sources must comply with the relevant European standards. Electrical equipment generating radiation shall be allowed only when the energy of radiated impulses or the energy of continuous radiation are limited to such a low value that eliminates the ignition of an explosive atmosphere.
Flames and hot gases	Open flames are not allowed for works near ball valves belonging to equipment group I and II - all categories.
Ignition of carbon steel body due to high-speed transport of oxygen	The flow velocity of oxygen in the valve made of carbon steel must be kept within the limits specified by the standard ČSN 386461 and listed in Table E. User is fully responsible for ensuring compliance with these provisions.

Potential ignition sources	Protective measures to eliminate the occurrence of effective sources
Exothermic reactions	Valves belonging to equipment group I and II: All materials prone to spontaneous combustion when in contact with the transported fluid or dust must be excluded in the structure of valves.  Ball valves intended for transport of oxygen must have all the parts that come into contact with oxygen, perfectly degreased and have a completely clean surface free of scale and rust. Actuators for valves for oxygen must be secured so its grease does not flow or drip out on the valve.
Adiabatic compression and shock waves	Valves belonging to equipment group I and II: Adiabatic compression and shock waves must be avoided by very slow opening of valve.

**Table E: Maximum allowed flow velocities of oxygen for ball valves made of carbon steel**

Range of working pressure	Maximum allowed flow velocity of oxygen
up to 5 kPa	15 m/s
from 5 kPa to 0.4 MPa	8 m/s
from 0.4 MPa to 10 MPa	4 m/s

### 3. Surface protection

The surface protection of ball valves depends on their material composition. Ball valves made of stainless steel are supplied without surface protection. The inner surfaces of ball valves made of carbon steel or alloy steel are protected by means of a suitable preserving agent (e.g. preserving oil). The same method is used to protect the raised faces of flanges or the welding edges of welding ends. Special requirements apply to ball valves for **oxygen** service. It is **necessary to strictly follow** the action from **Table D - exothermic reactions** for these valves.

The protection of outer surfaces shall be agreed between the Customer and the Manufacturer for the particular order. Up to DN 50, ball valves made of carbon or alloy steel grades are galvanized with subsequent chromate treatment (zinc layer thickness about 20 µm). For sizes DN 65 and above, a suitable coating system should be agreed with the Manufacturer.

Generally, it is recommended: - up to +80 °C – synthetic paints,  
- above +80 °C – paints with Al or Zn additives.

It is absolutely **necessary to comply with measures** relating to **coating** of ball valves intended to work in **explosive environments**:

**See Table E**

- Charging of layers of paint on the surface of the valve by static electricity - risk of electrostatic discharge,
- Sparks generated mechanically due to impact of steel object into outer surface of ball valve

## 4. Marking

Generally, each valve is marked by stamping and by attached identification plate. Marking meets the requirements of ČSN EN 19.

Valves with nominal size DN 65 and above are marked with the following data:

- nominal size DN
- nominal pressure PN
- Manufacturer's logo (if enough space is available)
- material grade
- heat numbers and stamps of inspectors
- size of the pipe to be welded to (for welding-end valves only)
- identification plate

Ball valves DN 50 and smaller usually do not have a marking on the bodies due to lack of space for stamping and they are equipped with an identification plate only.

Associated identification plate contains the following identification data resulting from the Pressure Equipment Directive 2014/68/EU of the European Parliament and of the Council, TP TC 032/2013, TP TC 010/2011 and is attached to each valve:

- nominal size DN (NPS)
- nominal pressure PN (Class)
- material grade
- serial number
- month and year of manufacture
- Manufacturer's logo
- type designation of the product
- limiting service temperature TS (if applicable)
- maximum pressure at the limiting service temperature PS (if applicable)
- "CE" mark and number of the notified body or "EAC" mark when supplying to Eurasian Custom Union

Additional information according to standard EN 13463-1: Non-electrical equipment for use in potentially explosive atmospheres and according to TP TC 012/2011:

- mark "Ex" or "Ex" when supplying to countries of Eurasian Union
- identification of equipment group and category, for equipment group II supplemented by character specifying type of explosive atmosphere "G" (air/gases, vapours, mists), "D" (air/dust), marking of the ambient temperature - TX
- certificate number
- additional information for safe use (e.g. specific temperature range of ambient air Ta in °C)

In case the ball valve is not intended for use in a potentially explosive atmosphere, the fields on the identification plate related to standard EN 13463-1 and TP TC 012/2011 shall not be filled.

The identification plate must be made of austenitic stainless steel.

## 5. Packaging and transportation

Unless otherwise stated in the purchase contract, the ball valves are supplied unpacked, in bulk on pallets, with the ball in open position. End flanges, welding ends, threaded ends and union ends are protected with plastic covers.

## 6. Storage

The valves have to be stored so as to prevent their damaging, impairment of their service, contamination and corrosion due to humidity. The valves have to be stored in dry and covered areas which are protected against weather and other detrimental effects. The recommended storage temperature should be between  $-10\text{ }^{\circ}\text{C}$  and  $+35\text{ }^{\circ}\text{C}$ . It is allowed to use end flanges and outer surface of the valve body for slinging of the valve during handling. Damages caused by improper storage and/or handling are not covered by the guarantee.

## 7. Installation

### 7.1. Preparation for installation

Identify the valves according to project documentation. Check the data on identification plates whether the valves correspond to the parameters of the pipeline system they are intended to be installed into, check the valve completeness, check the validity of test reports and other accompanying technical documentation.

Prior to installation, remove carefully the covers and packages - the sealing surfaces and operating and moving components have to remain free from impurities and solid particles (sand, metal chips, rust, dirt, etc.). Remove the layers of preserving agent from end flanges or welding ends. End flanges and welding ends have to be dry and free from damages, notches, paint and traces of rust.

If any damage to the valve due to handling and storage is found, the valve must not be used for installation.

### 7.2. Installation

Any work related to installation of the valves has to be performed by trained and qualified workers who are acquainted with the operation of the ball valves.

In case of flanged and wafer-type ball valves, insert a gasket between the raised faces of the valve and the raised faces of the pipes and use the bolting material to make a firm bolted connection. Tighten the bolts uniformly - one pair of opposite bolts and then the other pair. Check the tightening of all bolts and nuts after the installation once more. Bolting material and gaskets for flanged joints do not belong to the scope of the valve supply.

In case of ball valves with threaded ends with G threads according to ISO 228-1, a tight connection between the valve and the piping is achieved by tightening the coupling element or the union nut of the counterpiece. The sealing effect is usually achieved by a gasket inserted between the threaded end of the ball valve and the counterpiece. The method of sealing in threads by means of a PTFE tape, sealing compound, etc. is recommended to be used only in cases with no special demands on the sealing, where a leakage of the fluid cannot endanger safety and health of people and cannot contaminate the environment. Sealing compound and connecting counterpieces do not belong to the scope of the valve supply.

In case of ball valves with threaded ends with NPT threads according to ASME B 1.20-1, BS 21 or Rc and Rp threads according to ISO 7-1, a tight connection between the valve and the piping is achieved by tightening the threaded components. In order to provide for perfect tightness, the threads shall be covered with a PTFE tape or a sealing compound (e.g. made by Loctite). Sealing compound does not belong to the scope of the valve supply.

In case of ball valves with union ends, a tight connection between the valve and the piping is achieved by tightening the union nut of the counterpiece. Threads and dimension of pipe unions meet the requirements of ČSN EN ISO 8434-1. The sealing effect is achieved by the self-locking action of the metallic surfaces of the tapered portions of the pipe unions. The connecting element of the counterpiece does not belong to the scope of the valve supply.

In case of ball valves with welding ends, the welding operations shall be done by a qualified and certified worker in accordance with instructions given by the organization charged with the installation. The following instructions shall be adhered to:

- prior to welding, open the ball valve fully
- do not release and do not remove the sockets from the body!
- if the ball valve incorporates an O-ring or a seat made of thermoplastics in the vicinity of the weld, the place containing the sealing component shall be cooled down locally so as the temperature could not exceed 120 °C.

In case of ball valves with an actuator or a gearbox with hand wheel, the correct adjustment of the actuator in relation to the bore of the ball, i.e. the opened - closed end positions, shall be checked.

To adjust lengths in the piping system during installation of valves, use installation inserts or expansion joints and spacers. The valves shall never be used to support the piping. The installation shall be made in a way which will guarantee that minimum pressure/axial forces and bending moments act on the valve body. When cleaning the piping chemically or when blowing-through the piping system prior to its commissioning, replace the valve with a spacer of the same length.

## **8. Commissioning**

Apply the final paint to the piping and the valves. Protect the identification plates on the valves against paint in a suitable way (e.g. using an adhesive tape or a vaseline layer). When commencing the trial run, the processes of warming-up, filling and starting-up shall be gradual in all branches of the piping so as to avoid any unacceptable stress to act on the ball valve material. The speed of temperature change shall follow corresponding instructions and depend on the piping type and material. After starting the trial run, it is necessary to check the tightness of all removable joints. If untightness is revealed, retighten the bolts and/or the screw joints of flanges, bonnets, sockets or unions. There shall be no pressure inside the valve body cavity when tightening the removable joints! In steam service and in high-temperature service check the tightness of the joints regularly after service parameters are reached.

## **9. Operation and maintenance**

### **9.1. Operation during service**

It is recommended to check at least once every three months the tightness of the removable joints of the ball valves as well as the tightness of the joints between the valve and the piping. If untightness is revealed, retighten the relevant bolts/joints to restore tightness. If this does not help, it is necessary to replace the gaskets.

If untightness of welded joints is revealed, it is necessary to remove the valve from the piping and have it overhauled.

### **9.2. Maintenance**

The User has to carry out one cycle of OPEN-CLOSE-OPEN once every three months and to record it into the Service Journal.

A regular maintenance of the valves shall be done when the system is put out of service, usually once a year, according to internal maintenance plans of the organization in question. During maintenance, remove all defects that were revealed when doing inspections in service and repair damaged components of the valves. In case of untight flanged joints, replace the gaskets. The sealing surfaces have to be clean, dry and ungreased. In case of untight threaded joints, renew the sealing elements of the joints.

It is recommended also to remove the valves from the piping whenever the system is put out of service – if possible – and to check the condition of the packing and of the surfaces of the ball and the seats in terms of the excessive wear (abrasion) caused by impurities in the fluid. In case of an excessive wear of the packing, replace the packing. If the ball and seats show signs of heavy wear

due to which the closure is untight, or if the rubber O-rings of the ball are damaged, it is necessary to remove the valve from the piping and to have it overhauled.

Some of the ball valves are equipped with sealing O-rings on a stem that can be exchanged without removing the valve from the piping. The exchange of these O-rings can be performed during complete shutdown of piping only. When removing the ring is necessary to proceed carefully to avoid scratching of the sealing surfaces on the control stem or valve body. Removed ring must be replaced with a new one. After charging the pipe it must not be operated with a nut which pushes down the cover of exchangeable O-rings.

## 10. Repairs

During the guarantee period, only the Supplier or (by agreement) the User may make repairs. Only valve qualified workers or a servicing company and/or the Manufacturer of valves may make repairs. Prior to repair, specify the extent of damages and the method of repair or the servicing company. It is recommended to have the repair done by company KE-ARM.

## 11. Testing

Unless otherwise agreed, every ball valve is subject to the following tests according to EN 12266-1, 2:

- test P10 – shell strength test - with water - pressure of  $1.5 \times PN$
- test P11 – shell tightness test - with water - pressure of  $1.5 \times PN$ 
  - with air - pressure of  $1.1 \times PN$  (only for gases and steam)
  - with air - pressure of 0.6 MPa
- test P12 – seat tightness test - with water - pressure of  $1.1 \times PN$ 
  - with air - pressure of  $1.1 \times PN$  (only for gases and steam)
  - with air - pressure of 0.6 MPa
- test F20 – operability test - to verify whether the movement is without any seizure and the resistance to movement does not increase

When performing the shell strength and shell tightness tests (P10, P11) a visually detectable leakage through the pressure-containing walls is not permitted.

When performing the seat tightness test (P12) on valves with seats made of thermoplastics, the standard allowable leakage rate is A – no visually detectable leakage. For seats made of other materials (hard seats) the allowable leakage rate is B in accordance with Standard EN 12266-1, 2, but company KE-ARM prefers leakage rate A – no visually detectable leakage.

- test F21 – anti-static design - performed only upon request by Customer in a purchase order  
After the pressure test is completed and the valves are thoroughly dried, this test is performed on at least 5% of ball valves of the contract. Testing is performed with the DC voltage supply not exceeding 12 V. The electrical resistance must not exceed than  $10 \Omega$ .

Ball valves made according to American or British standards are usually tested according to API 598 or API 6D (EN 13942). The testing standard must be specified in the order. Testing methodology is similar to EN 12266-1, 2. If a customer requires testing in accordance with other national standards, these standards shall be always specified in the order.

## 12. Spare parts and servicing

Spare parts required for maintenance and repairs by the User include components that ensure operability of the ball valves. The operability depends essentially on the lifetime of the ball sealing system and the stem sealing system. The lifetime of metal parts of the body, the ball and the stem is at least 20 years in a non-aggressive environment. The lifetime (functional ability) of seats and rubber O-rings is at least 5000 cycles of „open-close“; if the ball is operated infrequently, their lifetime (to the first leakage) is given by the lifetime of the rubber, i.e. at least 3 years. However, the parameters of the fluid as specified in the purchase contract (temperature, pressure, chemical composition, purity) have

to be maintained. For this reason, the spare parts comprise mostly sealing materials in quantities based on the particular ball valves type which are supplied on the basis of a separate purchase order.

The cycle of replacement depends on service conditions (fluid, temperature, pressures) and on regular maintenance. The company KE-ARM stocks all sealing and bolting materials that may be required. KE-ARM provides for all servicing activities within the two years' guarantee period. After the guarantee period, the company can perform any repair or overhaul either at the premises of the User or, in case of repairs with great extent, at the premises of its own manufacturing company.

### **13. Special provisions**

The principles of the use of tools must be strictly adhered to for commissioning, operation and maintenance, local service or repair of ball valves working in a potentially explosive atmosphere – see **Table D!**

### **14. Guarantee and final provisions**

The Manufacturer guarantees that the product will retain its properties as specified by technical standards and/or other agreed documents for the period specified in the purchase contract. If a guarantee period is not contractually specified, a 24-month guarantee period starting from the day the product was dispatched from the manufacturing plant applies. The Manufacturer is responsible for defects that were discovered within the guarantee period and claimed in writing in due time. Tightening of gland is not considered for a subject of the warranty claim.

The Manufacturer's guarantee does not cover products that were:

- changed or modified without prior agreement with the Manufacturer
- incorrectly installed or used, or exposed to pressure, force or temperature overloading or unexpected chemical or mechanical effects of the service fluid
- if it was on a valve designed for use in potentially explosive atmospheres installed equipment that is not certified according to the European Directive 94/9/EC, or to EN 13463-1 and for deliveries to countries of the Eurasian Union according to TP TC 012/2011 or if certification of such equipment is inadequate for conditions of use
- user of valves operating in potentially explosive atmospheres failed to comply with safety requirements for the maximum allowable surface temperature of valve, with respect to type of surrounding hazardous atmospheric conditions or dust layer according to standards EN 13463-1, EN 1127-2 and failed to respect the principles of using ball valves working in potentially explosive atmospheres according to Tables D and E of this Installation and operating instructions, and for deliveries to countries of the Eurasian Union - TP TC 012/2011.

The company APD shall not be held responsible, out of scope specified herein, for both direct or indirect damages and losses resulting from wrong interpretation of these Installation and operating instructions.

The products meet all up-to-date regulations and requirements for pressure equipment set by the Decree of the Government No. 219/2016 Coll. and are certified for conformity with these rules and principles by Notified Body No. 1017 – TÜV SÜD Czech s.r.o. The Notified Body issued a certificate of EU-type examination (module B+C2) for this product in accordance with the Directive 2014/68/EU of the European Parliament and of the Council



manufacturer of industrial valves

Certificate of conformity with the standard ČSN EN 13463-1: Non-electrical equipment for potentially explosive atmospheres was issued by National testing authority No. 210 - Physical Technical Testing Institute, Ostrava-Radvanice for ball valves intended for use in potentially explosive atmospheres. Products meet the design requirements set by the Government Regulation No. 23/2003 Coll. as amended and Directive 94/9/EC of the European Parliament and of the Council.

Straight-flow ball valves in fire-safe design are certified according to EN ISO 10497, API 607 respectively by National testing authority No. 210 - Physical Technical Testing Institute, Ostrava-Radvanice.

In case of deliveries to countries of the Eurasian Union the ball valves comply with requirements TP TC 010/2011, TP TC 032/2013 and TP TC 012/2011 (non-electrical equipment) which has been confirmed by Russian certification and testing authority Ассоциация «СЦ НАСТХОЛ» by issuing relevant certificates.

The Manufacturer reserves the right to change the design of the product. Installation and operating instructions are subject to change without notice.

## **15. Disposal of the product**

When the life-time and the operating ability of the ball valve is over, the valve shall be disassembled and its components shall be sorted by individual materials. Metallic parts shall be brought to a designated collection place or metal salvage point according to the material grades. Non-metallic sealing elements shall be disposed of like common waste.

## **16. Attachments**

Data sheet of ball valve related to particular order.